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important rectification than the occasion may seem to need. The truth is, that it has other aspects. It is, indeed, pleasant to rescue a good determination from an undeserved reproach; and it is curious to remark how the very obviousness of the mistake —like Poe's "Purloined Letter"—has allowed it to pass unnoticed. But it is rather as a justifying example of the need of sceptical criticism that I adduce it.

At the same time I would not be understood to hold the opinion that any gravimetrical observation that ever was made is valueless merely because it cannot compare with modern ones. The comparison is rather with what is possible according to experience. Suppose that a local disturbance of ·05 line (or 5^s per diem) is admissible: then why should we scorn an observation against which nothing can be said except that it ranges between ·03 and ·06 line, merely because so large a range is nowadays unusual? In the present case there is a more cogent objection, for not only is the range (*i.e.* the probable error) large, but also the mean denotes a disturbance which is greater than any others at present known *in that region*. All the same, it cannot be rejected summarily, like a great many others I could name, as being certainly quite wrong.

There is a work by the same author entitled *Histoire de l'Astronomie*, published at St. Petersburg in 2 vols. in 1738, which I believe reviews all the early observations with pendulums; but I have hitherto been unable to obtain it—neither of the libraries at the British Museum nor at Burlington House possessing the work—and I am curious to know whether the error above indicated is reproduced there.

Collingwood,
1880, *November* 25.

Saturn in October 1880. By W. F. Denning, Esq.

Towards the end of September and in October, when the planet came to opposition with the Sun, I made a number of observations of his physical appearance as revealed by a Browning—with reflector of 10 inches' clear aperture, powers 450 and 500, which I usually found best adapted to the work. The planet was carefully scrutinised on Sept. 21, 27, 30, Oct. 2, 11, 12, 14, 18, 20, 23, 29, 30, 31, Nov. 2, 3, and 4, and the appearances presented were generally the same, with this obvious difference, that on the nights of best definition more details were glimpsed than on less favourable occasions. My observations were usually conducted for five or six hours, during the whole of which attention was divided between the planets *Saturn* and *Jupiter*.

The telescopic aspect of *Saturn* may be thus described:—

I. *The Ball.*—The equatoreal zone is the brightest region of the disk, and gives indication of white patches in moments of

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best definition. South of the equator there lies a faint, somewhat broad, dusky belt, in which no bright or dark spots are distinguishable; and next to this a slightly lighter interval, followed again by another belt, fainter than that just described, and displaying a very similar aspect. Another minute band of shading outlies this, and, further south, this is bounded by a very light zone, which contrasts greatly with the dusky bands. Where this bright belt comes up to the margin of the disk, it apparently projects beyond the limb, so as to give the impression of bright patches there, and causing a most striking distortion of the globe. Yet further south of the bright belt there come a series of very dark belts. The one immediately contiguous to the pole exhibits the greatest intensity of shading, and is, in fact, the darkest region of the disk, and there is a fainter band dividing this from the light belt. At the pole itself I at first suspected a bright cap, but renewed observations, made on several nights when the air was exceptionally steady and the planet free from the tremulous motion which so effectually destroys good definition, showed that the immediate pole, though lighter than the dark belt surrounding, was much enveloped in shade. North of the equator, and just skirting that part of the crape ring projected on the ball, is another faint belt, in which I can make out no variations of shading, nor are any distinct markings visible on the north segment of the ball, though it is much darker than the ring generally.

The divisions between the triple belt lying south of the equator, above described, were only observed on the best nights. As a rule, the belts were merged into one very broad band of shading, faintest at its south extremity.

II. *The Rings.*—The outer ring A is somewhat faint, especially at its extreme outer limits, and can be traced across the planet as a narrow bar of shading. Encke's division is not equally well observed at all times. Sometimes I see it as a pencil line only curving round the extremities of the major axis of the rings; but in the best moments it comes out plainer as a dark and distinct division. This was particularly noticed on Oct. 29 and Nov. 4. Ball's division was always very plain. The rings A and B where they skirt this division were much brighter than in other parts. On the ring A I frequently suspected faint lines of shading, but the slightest rippling or vibration prevented the observation of these delicate features, so that they never remained long enough in view to place their existence beyond a doubt. The brightest part of the system of *Saturn* is unquestionably the outer region of B, which is certainly brighter than the equatoreal light-zone. The interior part of B is shaded off until near the margin of the crape ring, where it apparenly recovers a little of the brightness which characterises its outer portions. Dawes and several other observers have represented the interior shading of B as gradual, but it always appears to me

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as being very decided and abrupt, and to show a faint pencil-line where it begins. Further on its interior the depth of shading is greater, though the extreme inner border becomes lighter again, perhaps by contrast with the darkness of the crape ring. The crape ring C appears certainly brighter on its inner margin than where it adjoins the luminous vein of B, but this also may be due in a measure to the effects of contrast, for the inner edge of the ring is bounded by dark sky, while the outer margin is against the light rim of B. I have seen no certain division in the crape ring, but have recorded the extreme darkness of its outer border, which may amount to the same thing.

No spots or irregular markings were traced upon the ball or the rings, except, perhaps, some bright patches on the equatoreal region and at the limbs on the bright belt near the south pole. The belts, though extremely faint, could be traced nearly right up to the margin of the disk, in this case offering a distinct contrast to the belts of *Jupiter*, which are obliterated in coming up to the limb. Moreover, while the equator of *Saturn* is the brightest zone of the disk, that of *Jupiter* shows the greatest depth of shading.

The night of Oct. 29 was one of the best of the season. Between 10^h and 11^h the details of the planet were presented with magnificent distinctness. Powers up to 600 could be employed with effect, and even with 750 the view was fairly good, though I found that nothing was gained by the employment of anything higher than 450.

On Oct. 31 the belts were very plain between 7^h and 8^h—the one nearest equator evidently darker than the others; and there were varieties in tone near the margin.

On Sept. 21 the dark space between the ball and crape ring looked larger on the east than west ansa, and slight differences were noticed on other nights, though not always of the same character.

But by far the most striking feature in the telescopic appearance of *Saturn* was the *curious figure* of the globe. The south pole, over which the dark belts lay, seemed *compressed* in the most remarkable manner; and where the bright belt intervened, the contrary effect was produced. Here the limb was apparently raised above the circular contour, so that the distorted image gave the planet that distinctly "square-shouldered" aspect which has been occasionally mentioned as a singular anomaly in observations of Saturn. The figure was on several recent occasions, when definition could hardly be improved, so clearly manifested, that the planet could not have been attributed a truly spherical form unless the observer had known it to have been unequivocally demonstrated by micrometric observations.

The explanation appears to me very simple. The singular figure is due to the contrasting effects of the belts. While the bright belt near the pole causes a very evident "shouldering" out of the two limbs at its extremities, the dark belts at the pole and